

ODONATA FROM HOT BROOK, SOUTH DAKOTA WITH NOTES ON THEIR DISTRIBUTION PATTERNS¹

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ABSTRACT: Ten species of Odonata are reported for the first time from Hot Brook, South Dakota, four of which are new published state records. The warm spring environment can account for the disjunct range extension of several species. North American biogeography of each species is briefly discussed.

DESCRIPTORS: Odonata, South Dakota, warm springs, new records, species ranges.

The aquatic insects of Hot Brook were sampled as part of an extensive study of the aquatic insect fauna of the Black Hills area of South Dakota. Hot Brook (figs. 1-4) is located in Hot Brook Canyon at the outskirts of Hot Springs, Fall River County, in far western South Dakota. It is a small stream about 12 miles long which is fed by a number of continuous warm springs over much of its length. On June 12, 1975, when collections were made, the water temperature ranged from 19-26°C, varying with respect to the spring inlets. This was greatly contrasted by the many cold streams encountered in the area which had temperatures averaging 12°C at the same time. The warm water environment and red bluffed canyon provided a unique collecting opportunity and yielded many very atypical species for the region.

The Odonata of South Dakota, in general, are poorly known (Montgomery, 1967). Of ten Odonata species sampled at Hot Brook, four are new state records and all are reported for the first time from Fall River County. Because of the unique environment of Hot Brook, many of the species are regarded as isolated, disjunct populations of biogeographic interest.

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Suborder Anisoptera

Family Libellulidae

Libellula saturata Ulmer. 2 ♂♂, 7 larvae. NEW STATE RECORD.

This species is common throughout Mexico and the southwestern United States. The northern limits of its general range appear to be southern California, Nevada, Utah, Colorado, Nebraska, and Missouri. It has been reported from isolated warm springs in Idaho, Montana, and Wyoming by Needham and Westfall (1955) and from Wyoming by Bick and Hornuff (1972) (fig. 1). The occurrence of *L. saturata* at Hot Brook is not surprising in light of these previous records at other warm springs in the northern latitudes. It is however a considerable eastern extension of the known warm springs distribution.

Suborder Zygoptera

Family Calopterygidae

Hetaerina americana (Fabricius). 1 ♂, 1 larva. NEW STATE RECORD.

H. americana has an extensive range over most of the United States with the exception of the far northwestern States. South Dakota seems to be near the northern limits of its range, but it is not restricted to warm water environments. This species has been known previously from the state by Westfall (personal communication, 1970) but has not been published as such.

Family Coenagrionidae

Argia alberta Kennedy. 1 ♂. NEW COUNTY RECORD.

This species was first reported from South Dakota by Bick and Hornuff (1972). It occurs throughout the intermountain area of the western United States, South Dakota being at the northeastern limit of its known range. Although it is frequently found at warm streams, it is by no means restricted to this type of habitat. Since no larvae were encountered, it cannot be determined if the single specimen had emerged from Hot Brook or if it had migrated from some other nearby cold stream.

Argia immunda Hagen. 4 ♂♂. NEW STATE RECORD.

In addition to the specimens collected during this present study, *A. immunda* was collected from Hot Brook in 1961, by G. F. Edmunds and

W. L. Peters (Gloyd, personal communication, 1975). A state record for this species, however, has not appeared previously in published form, although Westfall (personal communication, 1970) had known of the Edmunds' material. *A. immunda* is widely distributed throughout Mexico and the southwestern United States, Oklahoma being the northern limit of its normal range (Fig. 2). Hot Brook is a widely disjunct northern record for this species, being far removed from its next closest known locality in southern Oklahoma.

Argia vivida Hagen. 4 ♂♂, 3 ♀♀, 12 larvae. NEW COUNTY RECORD.

A. vivida was first reported from South Dakota by Kormondy (1957). Its main distribution is west of the Rocky Mountains (fig. 3). Like *L. saturata*, it has been taken at a number of warm springs in the northern latitudes, including Alberta (Walker, 1953), Idaho and Montana (Westfall, personal communication 1970), and Wyoming (Bick and Hornuff, 1972). The Black Hills region of South Dakota is the farthest east that we have seen verified records of *A. vivida*. As pointed out by Gloyd (1958), all other previous reportings of this species east of the Rocky Mountains are probably of its close relative *Argia plana* Calvert, which has been reported from the southeastern portion of South Dakota by Bick and Hornuff (1972).

Enallagma anna Williamson. 2 ♂♂, 1 ♀. NEW COUNTY RECORD.

This species was first reported from South Dakota by Kormondy (1957). Its distribution is strictly western, with South Dakota being at the eastern limit of its range. It is not known as being restricted to warm water environments.

Enallagma praevarum Selys. 1 ♂. NEW STATE RECORD.

This close relative of *E. anna*, is found throughout Mexico and the southwestern United States. This is evidently the first time these two species have been taken at the same locality. Even though Hot Brook is far north of its normal range (fig. 4), its presence was not totally unexpected because of recent collections of this species in Wyoming (Bick and Hornuff, 1972) and Montana (Bick and Hornuff, 1974).

Amphiagrion sp. 1 ♂. NEW COUNTY RECORD.

Amphiagrion abbreviatum was reported from South Dakota by Kormondy (1957). However, our specimen more closely resembles a yet undescribed species of *Amphiagrion* (*A.* sp. of L. K. Gloyd, MS) which is known from other localities in the central United States. It is possible that Kormondy's

record is also assignable to this yet undescribed species.

Ischnura perparva Selys. 3 ♂♂. NEW COUNTY RECORD.

This species is very common throughout the western United States, and is adapted to a broad range of habitats (Provonsha, 1975). It was first reported from South Dakota by Kormondy (1957), which remains near the eastern boundry of its known distribution.

Ischnura verticalis (Say). 1 ♂. NEW COUNTY RECORD.

Interestingly, this was the only species of Odonata taken at Hot Brook which has an eastern North American distribution. It was first reported for South Dakota by Kormondy (1957). At that time, it was the furthest west that it had been taken. However, it has recently been collected in Wyoming (Bick and Hornuff, 1972), and Montana (Bick and Hornuff, 1974). This species evidently develops in a wide variety of water temperatures throughout its range.

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